

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of)	
)	
Promoting Spectrum Access for Wireless)	GN Docket No. 14-166
Microphone Operations)	
)	
Amendment of Part 15 of the Commission's)	ET Docket No. 14-165
Rules for Unlicensed Operations in the Television)	
Bands, Repurposed 600 MHz Band, 600 MHz)	
Guard Bands and Duplex Gap, and Channel 37,)	
and)	
)	
Amendment of Part 74 of the Commission's)	
Rules for Low Power Auxiliary Stations in the)	
Repurposed 600 MHz Band and 600 MHz Duplex)	
Gap)	
)	
Expanding the Economic and Innovation)	GN Docket No. 12-268
Opportunities of Spectrum Through Incentive)	
Auctions)	

REPLY COMMENTS OF SHURE INCORPORATED

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SUMMARY

After more than 30 years of responsible spectrum use supporting large swaths of American commerce, entertainment, and culture, and nearly 15 years of debate over services permitted in TV white space, wireless microphone operators view this proceeding as potentially the final opportunity for the Commission to properly define professional audio operations and the protections they deserve. The record reflects widespread support for the Commission's proposal to expand Part 74 license eligibility to an important segment of smaller-scale wireless microphone users who can demonstrate "a particular need for, and the capability to provide, professional, high-quality audio that is integral to their events or productions." Shure reiterates that applicants should be deemed eligible upon demonstrating that the intended audience has an expectation of high-quality, professional audio and certifying that they have the requisite knowledge and training to operate a professional audio system, will avoid interference with, and coordinate with other spectrum users, in adherence with all applicable Commission rules and policies. The Commission should avoid creating a finite list of specific scenarios that would constitute a justifiable "need" for professional audio or "capability" to operate a professional audio system, as it is well-equipped to review licensing applications for eligibility on a case-by-case basis and need not resort to "bright-line" tests that may seem convenient to administer but that distort the class of parties with access to Part 74 licenses.

Finally, the Commission should reject Microsoft's proposal to prohibit expanded licensing for this limited user segment in the 600 MHz and TV bands. Even if suitable wireless microphone equipment were widely available for professional operation on frequencies outside the 600 MHz and TV bands, which it is not, Microsoft's proposal would impose untenable costs on microphone operators who would be forced – once again – to discard their existing equipment which they were compelled to purchase just a few years ago to replace 700 MHz equipment

when the FCC closed that band to wireless microphones. The Commission should also reject Microsoft's alternative proposal which presses for an overly narrow label (performing arts organizations), attempts to broker a "reserve" channel in the TV bands, and urges a litany of burdensome conditions that would inhibit expanded licensing and waste significant Commission staff resources.

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REPLY COMMENTS OF SHURE INCORPORATED

Shure Incorporated (“Shure”), by its undersigned counsel, hereby submits these reply comments in response to comments filed in the above-captioned proceeding.¹ The wireless microphone community overwhelmingly supports the Commission’s sensible proposal to expand Part 74 eligibility to an important segment of users who do not meet the requisite 50 device threshold in the existing rules but nevertheless have interference protection needs similar to a Part 74 licensee. Shure reaffirms that applicants should qualify for interference protection under Part 74 rules upon (A) demonstration of an audience’s expectation for professional-grade audio

¹ *In the Matter of Promoting Spectrum Access for Wireless Microphone Operations, et al.*, Order on Reconsideration and Further Notice of Proposed Rulemaking, GN Docket Nos. 14-166, 12-268, ET Docket No. 14-165, 32 FCC Rcd 6077, 6119 *et seq.* (2017) (“FNPRM”).

and (B) certification that an applicant has personnel with the requisite training, knowledge, and expertise with respect to skills necessary to properly operate a professional audio system, will avoid interference with and otherwise coordinate with other spectrum users, is prepared and able to assume the responsibilities of a Part 74 licensee, and will adhere to all applicable Commission rules and policies. The Commission should reject Microsoft's objection to license expansion in the 600 MHz and TV Bands and alternative proposal to impose burdensome conditions on licensing which ignore the practical availability of spectrum outside the 600 MHz band as a solution for smaller scale professional productions.

I. SHURE ECHOES COMMENTERS' OVERWHELMING SUPPORT OF THE COMMISSION'S PROPOSAL TO EXPAND PART 74 LICENSE ELIGIBILITY TO ADDITIONAL PROFESSIONAL WIRELESS MICROPHONE USERS

Comments filed in the proceeding demonstrate widespread support for the Commission's proposal to expand Part 74 license eligibility to wireless microphone users who can demonstrate "a particular need for, and the capability to provide, professional, high-quality audio that is integral to their events or productions."² There are important productions in the civic, cultural, corporate, education, and entertainment sectors where fewer than 50 wireless microphone devices are used – which is below the current threshold requirement for Part 74 license eligibility – but where the ability of the wireless microphone to operate without interference is absolutely critical to the event. Many parties whose productions require professional-grade, high-quality audio attested in the Comments to the compelling need for the Commission's rules to provide a reasonable means to obtain a Part 74 license and gain interference protection for critical wireless

² *Id.* ¶ 86.

microphone operations.³ More than one hundred comments on behalf of smaller theaters, universities and colleges, performing arts professionals, and audio engineers expressed strong support for the proposed expanded licensing eligibility for operations in the 600 MHz and TV bands.⁴ The rules proposed in the FNPRM strike “an appropriate balance in expanding licensee eligibility where there is a clear need for professional high-quality audio for particular events/productions, while ensuring that spectrum is shared effectively with existing wireless microphone licensees and remains available for other uses.”⁵ The Commission will serve the public interest by allowing skilled and responsible microphone operators to gain reliable access to interference-free spectrum for professional productions, performances, and presentations with smaller scale wireless audio requirements.⁶

A. The Commission Should Not Adopt a Narrow Set of Fixed Metrics to Define Part 74 License Applicants’ “Need”

The Comments filed are replete with scenarios in which fewer than 50 devices are used but where professional-quality sound is absolutely integral to the production. There is significant consensus among commenters that the Commission should find a “particular need” for professional-grade audio exists where a Part 74 applicant makes a substantive demonstration that the intended audience has an expectation of high-quality, professional-grade audio. Many parties concur with Shure that the Commission should not attempt to set precise and rigid parameters describing particular scenarios or adopt a narrow set of fixed metrics to which license eligibility

³ See generally Comments filed in ET Docket No. 14-165 (more than one hundred comments filed in support of expansion of “Part 74 license eligibility to include persons and organizations that can demonstrate the need for professional, high-quality audio and have the capability of providing it through conscientious use of wireless microphones” filed since October 2, 2017).

⁴ *Id.*

⁵ FNPRM, 32 FCC Rcd at 6124, ¶ 89.

⁶ See *Promoting Spectrum Access for Wireless Microphone Operations, et al.*, GN Docket Nos. 14-166, 12-268, ET Docket No. 14-165, Comments of Shure Incorporated at 8 (filed October 2, 2017) (“Shure Comments”).

would apply. While the Commission could consider myriad factors beyond a 50-microphone metric to establish whether an applicant has a justifiable need for protection under Part 74 of the Commission’s rules, as Performing Arts Wireless Microphone Working Group (“PAWMWG”) cautions, “if the Commission were to develop a finite list, another type of organization would soon appear with equivalent needs and credentials.”⁷ Instead, the rules should require applicants to describe the particular circumstances of their production which justify the need for professional-quality sound.⁸ The Commission might, in its assessment, consider factors suggested by commenters, such as the public purpose of the proposed use, the nature and extent of the audience, an applicant’s professional affiliations, cultural contributions, prior and future planned productions, use of assistive listening systems for hearing impaired audience members, commercial content creation, sound company experience, or venue show calendar, to name a few.⁹

The public interest benefits of providing interference protection for wireless microphones that provide critical support to professional productions in a wide range of sectors including theater, music, business, education and civic events, outweigh the speculative risk that a deluge of applicants that do not qualify under these guidelines will flood the Commission’s Part 74 licensing system. Shure agrees with Sennheiser’s observation that, as a practical matter, “any entity that has the wherewithal to prepare, pay for, and file an FCC license application and

⁷ *Promoting Spectrum Access for Wireless Microphone Operations, et al.*, GN Docket Nos. 14-166, 12-268, ET Docket No. 14-165, Comments of Performing Arts Wireless Microphone Working Group at 6 (filed October 2, 2017) (“PAWMWG Comments”).

⁸ *See id.* at 6.

⁹ *See Promoting Spectrum Access for Wireless Microphone Operations, et al.*, GN Docket Nos. 14-166, 12-268, ET Docket No. 14-165, Comments of Sennheiser Electronic Corporation at 7 (filed Sept. 29, 2017) (“Sennheiser Comments”); Comments of The Recording Academy at 5 (“Recording Academy Comments”); PAWMWG Comments at 6 (filed Oct. 2, 2017).

regulatory fees, with accompanying information to demonstrate eligibility, is most likely a professionally-run organization able to comply with the responsibilities of being a FCC licensee.”¹⁰ Moreover, licensees would be required to make legally binding certifications that their uses are limited to those applied for and approved by the Commission and like all other FCC license applicants that they will operate in compliance with FCC rules, or risk enforcement action in the event of abuse.¹¹

B. Part 74 Applicants Should Certify That They Have the Requisite Capability to Operate a Professional System

With respect to the proposed requirement that a license applicant have the “capability” to provide professional high-quality audio integral to productions, commenters illustrate the varied backgrounds and qualifications of experienced professional sound technicians that would satisfy this prong of the proposed requirement.¹² While there are several types of industry certifications and training that would meet and in fact exceed the requirement for “capability,” there is no industry-wide, uniform, or even dominant certification that should be referenced in the rules as a condition to demonstrating the “capability” to operate a professional audio system. Many parties described a wide-range of education, training, and hands-on experience of their audio experts; however, no matter the source of their knowledge, all shared the basic expertise and skills “necessary to properly operate a professional audio system in a spectrally efficient manner and

¹⁰ Sennheiser Comments at 6 (noting, “After all, the FCC makes far fewer demands on many other low power users of the spectrum, such as those that are licensed by rule.”).

¹¹ See Shure Comments at 10-11.

¹² See, e.g., *Promoting Spectrum Access for Wireless Microphone Operations, et al.*, GN Docket Nos. 14-166, 12-268, ET Docket No. 14-165, Comments of Kirkwood Theatre Guild at 2 (filed Oct. 11, 2017) (noting over 50 years of experience both professionally and in community theatre work, having managed “major audio/visual rental companies that supply equipment for meetings to Broadway Productions and everything in between” while other audio staff “have been doing sound work with churches and theatres for over 10 years”) (“Kirkwood Theatre Guild Comments”); Comments of James Olm, Caster College at 2 (filed Oct. 11, 2017) (describing sound technician as a “member of the AES, and is a certified Dante Audio over Ip technician – level 1 and 2. He is also is certified for Avid Pro Tools, and has been in sound for over 30 years”).

avoid interference with, and otherwise coordinate with, other spectrum users, and are prepared and able to assume the responsibilities of Part 74 licensees, comply with geolocation database registration procedures and responsibilities, and adhere to all applicable Commission rules and policies.”¹³

As Shure posited in its comments, applicants should be required to file an electronic certification that accompanies their application, affirming that they have sufficient knowledge and training with respect to (1) wireless microphone spectrum availability; (2) radiofrequency fundamentals; (3) antenna systems; (4) frequency coordination; and (5) operating authority limitations. By signing the electronic certification, applicants would attest that the statements listed in the application are true, complete, correct, and made in good faith.¹⁴ It is worth noting that such a detailed and enforceable certification is more extensive and demanding than the Commission’s rules applicable to other services that require professional services¹⁵ and, of course, far exceeds the level of experience and compliance required of unlicensed device users or users of devices licensed by rule.

II. THE COMMISSION SHOULD ADOPT SHURE’S SENSIBLE EXPANDED LICENSE ELIGIBILITY APPROACH FOR PROFESSIONAL WIRELESS MICROPHONE USERS WITH SMALLER SCALE PROFESSIONAL AUDIO REQUIREMENTS AND EXPERTISE

The Commission has previously recognized that “interference protection is just as important” for entities that “need to protect the quality of the performances that their audiences

¹³ Shure Comments at 10.

¹⁴ *See id.*

¹⁵ *See, e.g.*, 47 C.F.R. § 15.711(c) (discussing professional installation requirements for fixed white space devices); 47 C.F.R. §§ 20.21(f), 90.219(e)(5) (requiring signal booster installation by “qualified installer”).

demand and value.”¹⁶ Shure maintains that it is sufficient for applicants to demonstrate that the intended audience has an expectation of high-quality professional audio and that they further certify that they have the requisite knowledge and training to operate a professional audio system, avoid interference with, and coordinate with other spectrum users, in adherence with all applicable Commission rules and policies.¹⁷ Given the varied potential needs for professional sound quality, the Commission has recognized the public interest benefits of adopting a standard for review that “does not just focus on one particular class or group of users, or on the content of the presentation or event.”¹⁸

This licensing approach is not difficult to implement. The FCC is well-equipped to review licensing applications for eligibility on a case-by-case basis and need not resort to “bright-line” tests that seem convenient to administer but that distort the class of parties with access to Part 74 licenses. In fact, the Commission handles applications in many other similar licensing circumstances pursuant to well-established processes and procedures. Indeed, the Commission has considered on a case-by-case basis Part 74 license applications by “other groups such as live entertainment program producers, etc.” whose needs are similar to those of broadcast licensees, expressing confidence that “groups other than broadcast licensees can use these frequencies responsibly” and noting that “adequate sanctions exist for dealing with operations not in compliance with the rules.”¹⁹

¹⁶ *Revisions to Rules Authorizing the Operation of Low Power Auxiliary Stations in the 698-806 MHz Band et al.*, WT Docket Nos. 08-166, 08-167, ET Docket No. 10-24, Second Report and Order, 29 FCC Rcd 6103, 6108, ¶ 15 (2014) (“LPAS Revision Order”).

¹⁷ *See* Shure Comments at 7-8.

¹⁸ LPAS Revision Order, 29 FCC Rcd at 6110, ¶ 19.

¹⁹ *Amendment of Part 2, and Subpart D, Part 74, of the Commission's Rules and Regulations with Respect to the Use of Wireless Microphones*, Docket No. 20195, Report, Memorandum Opinion and Order, 63 FCC 2d 535, 542, ¶ 30 (1977).

The FCC has previously favored case-by-case consideration over “bright-line” tests to determine the regulatory treatment of particular services.²⁰ The Commission has noted that “a bright line test could cause more regulatory uncertainty than it resolves” in instances where “any such test we might adopt at this time would be based on assumptions and criteria that could soon be made obsolete by developments in technology and the marketplace.”²¹ Here too, the Commission should adopt the same sensible approach, given the diverse circumstances that might justify interference protection and the harm from interference to which smaller-scale professional wireless device users would otherwise be subject.

This licensing approach is consistent with the suggestions of most other commenting parties as discussed in Section I, above. Should the Commission feel that a case-by-case assessment is administratively burdensome, certain gating questions could be presented to reduce the number of case-by-case reviews that need to occur. The applicant’s required representations and certifications to the Commission, as well as the rigors of the licensing process itself, provide adequate safeguards against a proliferation of license applications from applicants without the requisite need or capability. License applicants are held accountable for the truthfulness and completeness of their statements in applications to the Commission²² and it is worth noting that FCC licensees are held to a higher standard of accountability than unlicensed device operators. For example, as noted by PAWMWG, in addition to a justification regarding need for

²⁰ See, e.g., *Amendment of the Commission’s Rules to Permit Flexible Service Offerings in the Commercial Mobile Radio Services*, WT Docket No. 96-6, Second Report and Order and Order on Reconsideration, 15 FCC Rcd 14680, 14683, ¶ 7 (2000) (finding it “inappropriate to establish a bright-line test” where one could not anticipate the evolution of services on CMRS spectrum or the “variety of services that will develop”).

²¹ *Id.*

²² See, e.g., 47 C.F.R. § 1.80 (discussing forfeiture proceedings against any person found to have “willfully or repeatedly failed to comply substantially with the terms and conditions of any license permit, certificate, or other instrument of authorization issued by the Commission”).

professional-grade audio and certifications regarding professional audio experience, applicants “could be required to certify, as part of their applications, that they will not register for protection in the database system any spectrum use where there is not a demonstrable need for high-quality wireless audio, intercom, or cue-and-control devices. Because database registrations are available for review by other potential spectrum users, unqualified uses can be identified and brought to the Commission’s attention.”²³

III. THE COMMISSION SHOULD REJECT MICROSOFT’S OBJECTION TO EXPANDED LICENSING FOR THIS LIMITED USER SEGMENT IN THE 600 MHZ AND TV BANDS

Microsoft is the primary entity protesting the Commission’s proposal to allow expanded licensing under specific and narrowly tailored circumstances. Microsoft inappropriately attacks license expansion in the 600 MHz and TV bands and unabashedly claims that this limited expanded licensing will somehow undermine efforts to promote rural broadband deployment potentially affecting the ability to “connect 24 million rural Americans to broadband.”²⁴ Microsoft grouches repeatedly that the Commission has already “accommodated” wireless microphones by freeing up an “additional” 150 MHz of spectrum and therefore, according to Microsoft, “there is no need to grant further special rights to wireless microphones in the TV bands and 600 MHz and TV band.”²⁵ Neither of these specious arguments withstands scrutiny and both should be summarily rejected.

At the outset, Shure notes that Microsoft’s relentless pursuit of a three-channel (18 MHz) TV band spectrum set-aside for proposed white space devices has nothing to do with rural

²³ PAWMWG Comments at 7.

²⁴ See *Promoting Spectrum Access for Wireless Microphone Operations, et al.*, GN Docket Nos. 14-166, 12-268, ET Docket No. 14-165, Comments of Microsoft Corporation at 1 (filed Oct. 2, 2017) (“Microsoft Comments”).

²⁵ Microsoft Comments at 6.

broadband deployment, at least not in this proceeding.²⁶ The Commission should reject outright Microsoft’s disingenuous attempt to bootstrap its effort to block Commission actions that meet the legitimate public interest needs of smaller scale productions requiring professional-grade audio by couching its position in terms of Chairman’s Pai’s rural broadband priorities.

Further, Shure takes issue with Microsoft’s portrayal of recent rule changes affecting wireless microphones as a series of “substantial accommodations” providing “new [spectrum] homes” and making several rules changes that “benefit” wireless microphones relative to white space devices. This vision distorts reality and ignores the inconvenient truth that, despite operating seamlessly on a shared basis with TV and Part 90 users for more than 30 years, wireless microphones have been subject to dramatic Commission rule changes over the past decade that caused tremendous disruption and upheaval, imposed significant costs on all wireless microphone users, and radically limited the spectrum available for the majority of wireless microphone operations.²⁷ All during a time when demand for wireless audio has been increasing. As discussed in detail at III.B below, Microsoft’s oft-repeated refrain that the Commission should not permit expanded licensing in the 600 MHz and TV bands because it has “accommodated” wireless microphones by “freeing up 150 MHz” of available spectrum

²⁶ See *In the Matter of Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auction et al.*, GN Docket No. 12-268, MB Docket No. 15-146, Notice of Ex Parte Communication of NAB at 1 (filed July 19, 2017) (charging that “Microsoft is engaged in a regulatory bait and switch, asserting that the promises it made about the potential for white spaces can only be realized if the FCC gives Microsoft something new: a guarantee of at least three vacant channels for white spaces operation nationwide.”); *Microsoft is Hustling Us With “White Spaces,”* WIRED.com (Jul. 26, 2017), <https://www.wired.com/story/microsoft-is-hustling-us-with-white-spaces/>.

²⁷ Wireless microphones have been forced to shut down long time operations in the 700 MHz band, adjust to significant sharing regimes relating to portable and fixed white space devices, and forced, again, to shut down 600 MHz operation due to the Incentive Auction and make way for repacking. See, e.g., *Revisions to rules Authorizing the Operation of Low Power Auxiliary Stations in the 698-806 MHz Band, et al.*, Report and Order and Further Notice of Proposed Rulemaking, 25 FCC Rcd 643 (2010); *Unlicensed Operation in the TV Broadcast Bands, Additional Spectrum for Unlicensed Devices below 900 MHz and in the 3 GHz Band*, Second Memorandum Opinion and Order, 25 FCC Rcd 18661 (2010); *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Report and Order, 29 FCC Rcd 6567 (2014).

elsewhere grossly overstates and mischaracterizes the practical availability of spectrum outside the 600 MHz band as a solution for smaller scale professional productions.²⁸

A. The Practical Consequence of Microsoft's Ill-conceived Approach Would Cause Severe Hardship and Disruption to Smaller Scale Users Seeking Protection for Professional Audio

Shure acknowledges that Microsoft wants to claim 600 MHz and TV band frequencies for other uses. However, the vast majority of wireless microphone equipment used for professional production operates in the UHF band and it has done so for decades.²⁹ Existing wireless microphone technologies, especially those used for professional audio including advanced digital systems and systems with the highest spectral efficiency and the highest resiliency to interference, overwhelmingly operate in the UHF band.³⁰

Even if suitable wireless microphone equipment were widely available for professional operations on frequencies outside the UHF, Microsoft's push to exclude the 600 MHz and TV Bands from expanded licensing would impose untenable costs on microphone operators who would be forced – once again – to discard their existing equipment which they were compelled to purchase just a few years ago to replace 700 MHz equipment when the FCC closed that band to

²⁸ Microsoft also suggests that, in this context, the Commission should do nothing for smaller scale professional wireless microphone users in the 600 MHz and TV bands because a decision otherwise would “decrease the utility of other socially and economically beneficial wireless uses.” Microsoft Comments at 3. The Commission should not entertain Microsoft's vague and unsubstantiated suggestion that superior social and economic benefits (of white space devices) are at stake if expanded licensing is permitted. To the contrary, the professional-grade productions that would be protected under the Commission's proposal would cover many diverse productions in the music, theater, and the performing arts industry as well political speech, industrial training, commercial product launches, and professional productions for educational and civic purposes. These productions represent existing valuable economic, cultural, political benefits that millions of Americans enjoy and rely on today.

²⁹ See *Overview of Digital Wireless Microphone Systems*, Shure Blog (January 5, 2015), <http://blog.shure.com/an-overview-of-digital-wireless-microphone-systems/> (“Most wireless microphone and IEM systems in the US operate between 470–698 MHz in what is known as the UHF (Ultra High Frequency) band or TV band.”); *Why is UHF Spectrum So Important for Wireless Microphones*, Soundhub.Audio (Dec. 8, 2015), <http://soundhub.audio/why-is-uhf-spectrum-so-important-for-wireless-microphones/>.

³⁰ See *id.*

wireless microphones.³¹ Further, it is relevant that smaller scale unlicensed wireless microphone users purchased their existing 600 MHz equipment on the basis of Commission rules that provided for two reserve channels free from white space device interference and an FCC process that allowed for registration, on a case-by-case basis, to protect critical applications from interference.³² The Commission’s decision to eliminate *both* the unlicensed database registration pathway *and* the two reserved wireless microphone channels, in anticipation of the Incentive Auction and TV Band repacking, left no means for an unlicensed wireless microphone operator facing demands for professional-grade audio to secure interference protection in the TV Band.³³ Against this background, Shure and many other parties very much welcome the Commission’s effort in this proceeding to make what, in reality, are modest changes to license eligibility rules to address the needs of this professional class of wireless microphone users.

Many commenters emphasize the extreme financial burden that changes in Commission spectrum policies have recently imposed on wireless microphone operators and who could, again, be faced with if the Commission’s decides to limit expanded Part 74 eligibility to spectrum other than spectrum in the 600 MHz and TV bands as Microsoft urges – if and when such equipment becomes available. The Theatrical Sound Designers and Composers Association noted that “the vast majority of professional regional and academic producers own their

³¹ See *Amendment of Part 15 of the Commission’s Rules for Unlicensed Operations in the Television Bands, Repurposed 600 MHz Band, 600 MHz Guard Bands, and Duplex Gap, and Channel 37 et al.*, ET Docket No. 14-165, GN Docket No. 12-268, Comments of Shure Incorporated at 38 (filed Feb. 4, 2015).

³² See *Unlicensed Operation in the TV Broadcast Bands and Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz band*, ET Docket Nos. 04-186 and 02-380, Second Memorandum Opinion and Order, 25 FCC Rcd 18661, 18674-75, ¶¶ 31-32 (2010).

³³ See *Amendment of Part 15 of the Commission’s Rules for Unlicensed Operations in the Television Bands, Repurposed 600 MHz Band, 600 MHz Guard Bands and Duplex Gap, and Channel 37, and Amendment of Part 74 of the Commission’s Rules for Low Power Auxiliary Stations in the Repurposed 600 MHz Band and 600 MHz Duplex Gap, Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, ET Docket No. 14-165, GN Docket No. 12-268, Order, 30 FCC Rcd 9551, 9588, ¶ 266 (2015).

equipment and replacement would create an extraordinary hardship” particularly given that “some producers were forced to purchase new equipment when the 700 MHz bands became unavailable” at a cost of “\$1,700.00 to \$3,000.00” for each channel of “professional RF.”³⁴ Kirkwood Theatre Guild stated that its existing devices “have at least another 6 years of life” before considering replacement.³⁵ UNC Charlotte College of Arts + Architecture emphasized that “[t]he costs involved to replace equipment that was once legal to operate but is no longer is not insubstantial”³⁶ The Commission should not expect that smaller-scale users have the resources to purchase expensive new equipment, even if it were available, to operate in recently identified supplemental spectrum.

B. Operation on Newly Identified Spectrum Outside the TV Bands Is Not a Practical Solution

As a practical matter, the newly identified spectrum outside the TV Bands (900 MHz, 1.4 GHz, and 7 GHz) is of limited utility in the short and medium term, in part, because there is little to no wireless microphone equipment commercially available to operate on those frequencies. Further, specific rule limitations on these frequencies inhibit access for the type of user seeking eligibility under the Commission’s proposed expanded licensing, making this spectrum ill-suited to the small scale professional wireless microphone user at issue in this proceeding. For example, in the 1.4 GHz band, the Commission’s recently established rules provide that wireless

³⁴ *Promoting Spectrum Access for Wireless Microphone Operations, et al.*, GN Docket Nos. 14-166, 12-268, ET Docket No. 14-165, Comments of Theatrical Sound Designers and Composers Association at 2 (filed Oct. 11, 2017).

³⁵ Kirkwood Theatre Guild Comments at 2.

³⁶ *Promoting Spectrum Access for Wireless Microphone Operations, et al.*, GN Docket Nos. 14-166, 12-268, ET Docket No. 14-165, Comments of Dean Adams, UNC Charlotte College of Arts + Architecture at 3 (filed Oct. 10, 2017).

microphone use is specifically for large events (for example, using 100 or more devices),³⁷ “for situations in which the other available spectrum resources are insufficient.”³⁸ In addition, all uses are subject to prior coordination with AFTRCC.³⁹ Moreover, there is currently no certified commercially available equipment that meets the unique (and still undeveloped) technical requirements for such coordination with AFTRCC.

A closer look at the “150 MHz” of spectrum that Microsoft claims is the solution for smaller scale wireless operators in need of protection for professional productions reveals significant roadblocks to using this spectrum due to technical, operational or regulatory constraints, and/or lack of availability for use in the foreseeable future, as illustrated in Figure 1, below.

Figure 1: Limitations on Spectrum “Available” for Wireless Microphone Operations Outside of the TV Bands

<i>Frequency Band</i>	<i>Licensed/ Unlicensed</i>	<i>Rule Part</i>	<i>Limitations</i>
26.1-26.48 MHz (VHF)	Licensed	Part 74	Due to long wavelength (~11.5 m), use is limited to control and cueing applications.
161.625-161.775 MHz (VHF)	Licensed	Part 74	Available bandwidth is very small (150 kHz), which is insufficient to support even one microphone.

³⁷ *Promoting Spectrum Access for Wireless Microphone Operations* et al., GN Docket No. 14-166, 12-268, Report and Order, 30 FCC Rcd 8739, 8784, ¶ 116 (2015).

³⁸ *Id.* ¶ 117.

³⁹ *Id.* ¶ 118.

<i>Frequency Band</i>	<i>Licensed/ Unlicensed</i>	<i>Rule Part</i>	<i>Limitations</i>
Portions of 169-172 MHz band (VHF)	Licensed	Part 90	Most spot frequencies available for licensed Part 90 wireless microphone use are narrowband, 54 kHz channels suited only for low-fidelity uses. Due to intermodulation considerations, only a subset of these can be used together. Four, recently designated new “wideband” (200 kHz) channels may be suitable for uses that only require a few channels.
88-108 MHz (FM)	Unlicensed	Part 15	Radiated power level too low for wireless microphone operation; fully occupied in most areas.
450-451, 455-456 MHz (UHF)	Licensed	Part 74	Use is limited to control and cueing applications, due to very small band segments.
941.5-952, 952.85-956.25, 956.45-959.85 MHz (UHF)	Licensed	Part 74	Subject to SBE frequency coordination requirements; no equipment currently available in these bands to Shure’s knowledge.
902-928 MHz, 2.4 GHz, 5 GHz (ISM bands)	Unlicensed	Part 15	FCC rules restricting minimum bandwidth and hostile unlicensed spectrum environment limit quality of service and number of wireless microphones that can practically operate together.
1435-1525 MHz Band	Licensed (larger, fixed venues)	Part 74	No compliant equipment available; required coordination and permission from AFTRCC required; band designated for large events (more than 100 mics).
1920-1930 MHz (unlicensed PCS)	Unlicensed	Part 15	DECT standard impacts audio quality and latency; not suitable for professional sound reinforcement applications.
6875-6900 MHz and 7100-7125 MHz (7 GHz Band)	Licensed	Part 74	No compliant equipment available; advance frequency coordination required.

<i>Frequency Band</i>	<i>Licensed/ Unlicensed</i>	<i>Rule Part</i>	<i>Limitations</i>
Ultra-wideband (3.1-10.6 GHz)	Unlicensed	Part 15	FCC Rules restrict power output, limiting practical working range to very short distances; body absorption and shadowing effects further impact operation.

IV. THE COMMISSION SHOULD REJECT MICROSOFT’S PROPOSAL TO INHIBIT EXPANDED LICENSING THROUGH EXCESSIVE REGULATION

While Microsoft itself argues *against* the administrative burdens of a case-by-case review,⁴⁰ it urges a litany of burdensome and pointless conditions that would inhibit expanded licensing and waste significant Commission staff resources.

A. The Commission Should Not Adopt a Narrow “Performing Arts Organization” Eligibility Classification

The Commission should reject Microsoft’s attempt to frustrate expanded licensing by pressing for an overly narrow label (performing arts organizations) as an unnecessary roadblock to licensing. Shure agrees that everyday uses such as microphones used in “yoga studios or corporate meeting spaces”⁴¹ do not warrant licensing. Indeed, the FNPRM is clear that the proposed change to Part 74 licensing eligibility is strictly aimed at professional uses which do not meet the 50 device threshold in the rules. The Commission should not be distracted by such “red herring” examples. Interference protection is needed for smaller scale professional grade audio required in production facilities and presentation spaces that do not fit within the narrow literal term “performing arts organizations,” including, for example, the political candidate

⁴⁰ See Microsoft Comments at 17.

⁴¹ Microsoft Comments at 14.

speech at the town hall meeting, the live audience TED talk, or the CEO presentation at a large company presentation facility.

B. The Commission Should Not Adopt Microsoft’s Proposed Thicket of Unnecessary Regulation for Expanded Licenses and Registration

Shure opposes other burdensome conditions proposed by Microsoft including rules that constrain when LPAS entities may register for spectrum use, prohibit full-day reservations, cap reservations for a period not to exceed one month, limit use to actual “performance purposes,”⁴² which disregard rehearsals and increase administrative burdens for longer running performances, productions or presentations.

C. The Commission Should Reject Microsoft’s Attempt to Bargain for a White Spaces “Reserve” Channel in the TV Bands

The FCC should reject Microsoft’s transparent attempt to broker a “reserve” channel in the TV bands under the guise of rural broadband deployment. Microsoft argues that Part 74 license expansion “will undermine . . . the potential to connect 24 million rural Americans to broadband”⁴³ and therefore at least one vacant television channel should always remain for WSD operations. But, any scenario that results in congestion sufficient to require use of the last vacant channel, while likely rare, would almost certainly arise in an urban setting and would have no impact on Microsoft’s ability to provide broadband access in a rural setting. Indeed, it strains credibility to fathom how Part 74 licensing and interference protection for this limited segment of microphone users – smaller scale professional users – would threaten the deployment of broadband in rural areas.

⁴² See Microsoft Comments at 12-13.

⁴³ Microsoft Comments at 1.

Contrary to the picture painted by Microsoft, registration by a licensed wireless microphone operator would not block white space devices throughout an entire city. By definition, the class of wireless microphone user at issue in this proceeding operates routinely on smaller scales with fewer than 50 wireless microphones. Registration affects only areas immediately surrounding the venue for a finite period of time in order to meet the expectations of audiences associated with an important professional production, presentation or performance.

V. THE PROPOSED EXPANDED LICENSING FOR SMALL SCALE PROFESSIONAL PRODUCTIONS IS NOT INCONSISTENT WITH CONTINUED ADVANCEMENTS IN WIRELESS MICROPHONE SPECTRUM EFFICIENCY

Shure agrees with Microsoft that wireless microphone manufacturers and users have made great strides in advancing spectrally efficient technologies and highlights that this in fact demonstrates continued responsible stewardship of scarce spectrum resources. However, the Commission should be aware of one fallacy that runs through Microsoft's comments. While acknowledging advancements in wireless microphone spectral efficiency, Microsoft improperly assumes that gains in spectral efficiency eliminate the need for interference protection. Unlicensed wireless microphone users need license eligibility not to gain greater efficiencies but rather to prevent co-channel interference from other devices.

In its comments, Microsoft appears to conflate the concepts of co-channel interference and the ability of existing wireless microphone technologies to operate in "challenging environments" that address sound dropouts caused by reflections in a multipath environment.⁴⁴ As Shure has explained in the past, these highly efficient technologies only work in "clean"

⁴⁴ See Microsoft Comments at 9.

spectrum and would be compromised in the presence of co-channel interference.⁴⁵ Therefore, Microsoft's attempts at limiting the interference protection available to licensed wireless microphone operations completely works counter to the benefits of these spectrum efficiency gains.

VI. CONCLUSION

Shure respectfully submits that the Commission should adopt Shure's sensible expanded license eligibility approach for professional wireless microphone users with smaller scale professional audio requirements and expertise, as supported by the overwhelming majority of comments filed in the proceeding. Further, the Commission need not and should not adopt the alternative proposals advanced by Microsoft. After more than 30 years of responsible spectrum use supporting large swaths of American commerce, entertainment, and culture, and nearly 15 years of debate over services permitted in TV white space, wireless microphone operators view this proceeding as potentially the final opportunity for the Commission to properly define professional audio operations and the protections they deserve.

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⁴⁵ See Shure Reply Comments, ET Docket No. 14-165, at 10 (filed Feb. 25, 2015).